

Linear Word Problems

- ① let x = amt invested in bonds
 $2x$ = amt invested in stocks

$\begin{matrix} \text{Amt invested} \\ \text{in Stocks} \end{matrix} + \begin{matrix} \text{Amt invested} \\ \text{in Bonds} \end{matrix} = \text{Total Amt Invested}$

$$2x + x = 18,000$$

$$3x = 18000$$

$$x = 6000$$

Therefore the amount invested in stock is \$12,000
 and the amount invested in bonds is \$6,000

- ② let r = regular hourly rate
- $\begin{matrix} 40 \text{ regular hours} \\ 4 \text{ Sunday} \\ 6 \text{ Reg hours} \end{matrix} \left. \vphantom{\begin{matrix} 40 \\ 4 \\ 6 \end{matrix}} \right\} \text{Total 50 hours}$
- Gross weekly wages = Regular pay + OT pay + Sunday pay
- $$342 = 40 \cdot r + 1.5 \cdot 6 \cdot r + 2 \cdot 4 \cdot r$$
- $$342 = 40r + 9r + 8r$$
- $$342 = 57r$$
- MARK'S regular hourly wage is \$6
- $$6 = r$$

- ③
- $w+6$
 $P=84$

w
- let w = width
 $w+6$ = length
- $$P = 2L + 2W$$
- $$84 = 2(w+6) + 2w$$
- $$84 = 2w + 12 + 2w$$
- $$72 = 4w$$
- $$18 = w$$
- The width is 18 meters. The length is 24 meters

Unit 7

(2)

④

	rate km/hr	time hours	Distance (km)
MC	60	1.25	1.25(60)
Truck	x	1.25	1.25(x)

let x = the rate of
the truck

The truck and the motorcycle do not travel the same distance, but they are related (the motorcycle traveled 25 km more than the truck). Therefore, once we express the distances, we can use the relationship of the distances to form an equation.

After 1.25 hours...

The motorcycle's distance = The truck's distance + 25 km

$$1.25(60) = 1.25x + 25$$

$$125(60) = 125x + 2500$$

$$7500 = 125x + 2500$$

$$5000 = 125x$$

$$40 = x$$

The truck is
travelling at
40 mph

⑤ If the average is 56% after 7 tests, then
let x = sum of previous test scores
 $56 = \frac{x}{7}$
392 = total points score till now
After the student takes one more test

$$\text{new average} = \frac{\text{new total points}}{8}$$

let y =
new test
score

$$60 = \frac{392 + y}{8}$$

$$480 = 392 + y$$

$$88 = y$$

The student needs
to score an 88%
on the next test.

Unit 7

$$t = \frac{d}{r}$$

(3)

⑥

	rate (mph)	time (hours)	distance miles
down-Stream	$7+x$	$\frac{12}{7+x}$	12
upstream	$7-x$	$\frac{8}{7-x}$	8

let x = the rate of the current

Time needed to travel 12 miles down stream = Time needed to travel 8 miles upstream

$$\frac{12}{7+x} = \frac{8}{7-x}$$

$$84 - 12x = 56 + 8x$$

$$28 = 20x$$

$$1.4 = x$$

The river is moving at a rate of 1.4 mph.

Note When a boat travels upstream, it is slowed down by the current. When it travels downstream, it is pushed along by the current and the boat's speed increases. The rate that the boat travels in still water is the rate it travels without help or hindrance.
(downstream) (upstream)

Also - the distances traveled are not the same ($12 \neq 8$), but the time to do so is the same, so, we express time as $\frac{d}{r}$ and equate those expressions to get an equation.

⑦

	Part accomplished in 1 hour Rate	Time (hours)	Part accomplished
Shannon	$\frac{1}{4}$	$\frac{5}{2}$	$\frac{5}{2} \cdot \frac{1}{4} = \frac{5}{8}$
Caitlin	$\frac{1}{c}$	$\frac{5}{2}$	$\frac{5}{2c}$

Unit 7 (4)
 Note We use the relationship that C + S can do the whole job together in 2.5 to get an equation

Shannon can finish in 4 hours, so her rate is $\frac{1}{4}$ part per hour.

let c = the time it take Caitlin to do the whole job. Her rate is $\frac{1}{c}$ per hour

Shannon's part + Caitlin's part = whole part

$$8c \left[\frac{5}{8} + \frac{5}{2c} = 1 \right]$$

$$5c + 20 = 8c$$

$$20 = 3c$$

$$6\frac{2}{3} = c$$

Caitlin can finish the job in $6\frac{2}{3}$ hours

⑧

	r	t = $\frac{d}{r}$	d
	mph	hours	
Amy	$m+10$	$\frac{480}{m+10}$	480
MATT	m	$\frac{480}{m}$	480

let m = Matt's rate

(5)
Note the times are related ($\frac{3}{4} \cdot \text{Matt's} = \text{Amy's}$).
Therefore, if we express each of their rates, we can make an equation using those expressions

$$\text{Amy's time} = \frac{3}{4} (\text{MATT's time})$$

$$\frac{480}{m+10} = \frac{3}{4} \left(\frac{480}{m} \right)$$

$$\frac{480}{m+10} = \frac{360}{m}$$

$$480m = 360m + 3600$$

$$120m = 3600$$

$$m = 30$$

Matt is travelling at a rate of 30 mph and Amy is travelling at a rate of 40 mph.

⑨

	Weight (g)	% gold	Amt of gold (g)	Note
START	90	.9	.9(90)	5 rings weigh a total of 90 g.
ADD	X	0	0X	
Finish	$18+X$.75	$.9(90) + 0X$ $.75(18+X)$	We have 2 ways of expressing the resulting portion of metal that is gold.

let x = amt (g) of silver

$$.9(90) + 0X = .75(18+X)$$

$$81 = 67.5 + .75x$$

$$13.5 = .75x$$

$$18 = x$$

18 g. of Silver should be added.